



MARSHALL STAR

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Tuskegee joins NASA research partnership

by Sherrie Super

Tuskegee University in Tuskegee, Ala., one of the nation's top, predominantly minority, research institutions, has joined an alliance of NASA and university scientists to explore the secrets of space science, Earth's weather, propulsion and more.

Tuskegee University is now a member of the National Space Science and Technology Center (NSSTC) in Huntsville. The partnership includes the Marshall Center, federal agencies, industry and the Alabama Space Science and Technology Alliance — a group of seven Alabama universities.

"Through the NSSTC, some of the world's best scientists and engineers share ideas and facilities," said Art Stephenson, Marshall Center director. "The addition of Tuskegee University brings even more talent, resources and diversity to this research endeavor."

A recent "NASA Day" at Tuskegee University marked the conclusion of a process that began in late 2001, when Tuskegee joined the space alliance. Highlights of the NASA event included campus laboratory tours, career discussions and visits with students by NASA officials and Tuskegee alumni who now contribute to the nation's space program through their work at Marshall.

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Photo by Emmett Given, NASA/Marshall Center

From left, Marshall Center Director Art Stephenson, Marshall Assistant Director and Chief Engineer for Propulsion Robert Sackheim and Dr. Legand L. Burge, Tuskegee University's dean of engineering, architecture and physical sciences, during a visit on the Tuskegee campus.

Where lightning strikes

Maps from orbiting sensors may reveal where powerful bolts will hit

Marshall news release

Lightning. It avoids the ocean, but likes Florida. It's likely to strike in the Himalayas and even more so in central Africa. And lightning almost never strikes the North or South Poles.

These are just a few of the things NASA scientists at the National Space Science and Technology Center in

Huntsville have learned by using satellites to monitor worldwide lightning.

"For the first time, we've been able to map the global distribution of lightning, noting its variation as a function of latitude, longitude and time of year," said Hugh Christian, a scientist at the Marshall Center and project leader for the lightning team at the technology center's Global

Hydrology and Climate Center.

This new perspective on lightning is possible thanks to two satellite-based detectors: the Optical Transient Detector and the Lightning Imaging Sensor.

"These are two optical sensors that we've flown in lower Earth orbit," said Christian, whose team developed the

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Tuskegee

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Founded by Booker T. Washington in 1881, Tuskegee University is consistently among the top 10 Historically Black College and Universities in federally financed research and development expenditures.

"Tuskegee University is one of the nation's top producers of African-American aerospace science engineers," said Charles Scales, director of Marshall's Equal Opportunity Office, who led the NASA Day event. "It's also a national leader in African-American engineering graduates in chemical, electrical and mechanical engineering. This level of engineering expertise will be a great asset to the NSSTC."

Tuskegee University offers a Ph.D. program in Materials Science and Engineering, which aims at substantially increasing the number of African

American Ph.D.s. The Center for Advanced Materials at Tuskegee University, which received a considerable amount of support through several research and training grants from the Marshall Center, houses the Ph.D. program. It is anticipated that Tuskegee University will graduate more African American Ph.D. candidates in materials science and engineering than any institution in the nation.

Dr. Shaik Jeelani, vice president for research and sponsored programs at Tuskegee University, said the National Space

Science and Technology Center partnership offers exciting opportunities for Tuskegee faculty and students as well. "Through the NSSTC partnership, Tuskegee researchers and students will have another avenue for conducting real-world research and collaborating with other people who have dedicated their careers to science and engineering," he said.

Tuskegee University's president, Dr. Benjamin F. Payton, who chairs the President's Advisory Board on Historically Black Colleges and Universities, expressed his gratitude to the NASA team for inviting Tuskegee University to join NSSTC. "This partnership will help T.U. move to a new level of excellence in engineering education," Payton said.

In addition to Tuskegee University, members of the Alabama Space Science and Technology Alliance include the University of Alabama in Huntsville; Alabama A&M University in Huntsville; Auburn University in Auburn; the University of Alabama at Tuscaloosa; the University of Alabama at Birmingham; and the University of South Alabama in Mobile.

The National Space Science and Technology Center's primary research areas include space science, Earth sciences, materials science, biotechnology, propulsion, information technology and optics.

The writer, employed by ASRI, supports the Media Relations Department.

Holloway retiring as International Space Station manager Gerstenmaier named successor

NASA Headquarters release

Tommy Holloway, manager of the International Space Station Program Office at Johnson Space Center in Houston, has announced plans to retire, effective July 3.

Holloway's deputy, William H. Gerstenmaier, will take over as program manager.

Holloway was named space station manager in April 1999, after serving as manager of the Space Shuttle Program for nearly four years. He began his career with NASA in 1963, planning activities for Gemini and Apollo flights at what was then known as the Manned Spacecraft Center. He was a flight director in Mission Control for early Space Shuttle flights and became chief of that office in 1985.

In 1989, he was named assistant director for the Space Shuttle Program for the Mission Operations Directorate. He served as deputy manager for program integration with the Space Shuttle Pro-

gram and director of the Phase I Program of Shuttle-Mir dockings before being named Space Shuttle program manager in August 1995.

"Tommy's been a fixture with NASA for nearly four decades and his contributions to the agency's human space flight program and the Johnson Space Center are considerable," said Frederick D. Gregory, associate administrator for Space Flight at NASA Headquarters in Washington. "His leadership helped set the standards of safety and success for our Space Shuttle and International Space Station programs. I will miss him both personally and professionally."

Gerstenmaier first joined the Space Shuttle Program in 1980, serving as propulsion flight controller. In 1992, he received his first managerial assignment for the Orbital Maneuvering Vehicle Project. Gerstenmaier was selected in 1995 to be the operations lead in Moscow for the first phase of the Shuttle-Mir

program, serving as lead for the ground control team.

In August 1998, Gerstenmaier was named Space Shuttle Program integration manager and in December 2000, he was selected as deputy manager of the International Space Station Program. Since then, he's been responsible for the day-to-day management, development, integration and operations of the orbiting research laboratory.

"Bill and Tommy have worked side-by-side for years on a variety of projects, so I expect this to be a smooth and seamless transition," Gregory said. "Bill's extensive program knowledge and experience will be a steady force as we move forward with the International Space Station construction and research."

Additional information about the Space Shuttle and International Space Station is available on the Web at: <http://spaceflight.nasa.gov>

Marshall team members win major technology award for innovation that digitally enhances video

VISAR becoming widely used law enforcement tool

by Celeste Atkins

Three Marshall team members won the Federal Lab Consortium's Excellence in Technology Transfer Award for a computer-based system that is becoming a widely used law enforcement tool to digitally enhance video.

It is the latest in a number of awards recognizing the far-reaching capabilities of VISAR, short for Video Image Stabilization and Registration.

VISAR is a system that can make minute details in poor quality video, such as car license plates, readable. The innovative technology was created by Dr. David Hathaway, a solar physicist, and Paul Meyer, an atmospheric scientist, at the National Space Science and Technology Center in Huntsville. The organization is a partnership of the Marshall Center, Alabama universities and other federal agencies. Sammy Nabors, commercial technology lead at Marshall, also was recognized for his work as commercialization representative for VISAR.

Hathaway, Meyer and Nabors received the award at the consortium's annual meeting in Little Rock, Ark.

VISAR was chosen for the honor from dozens of entries, including submissions from the U.S. Department of Defense, Department of Energy and the Department of Health and Human Services. Among other requirements, the innovations submitted were required to have potential for overwhelming positive impact on society, and must have been commercialized into the private sector. A panel of experts from industry, state and local government, academia and other Federal



Photo by Emmett Given, NASA/Marshall Center

From left, Sammy Nabors, Dr. David Hathaway and Paul Meyer with award for VISAR.

Lab Consortium members, judged entries. The consortium promotes cooperation between government and private labs to exchange ideas and enhance the nation's economic competitiveness.

The scientists' foray into the world of forensics began when they helped the FBI analyze video of the bombing that killed two people and injured hundreds more at the 1996 Olympic Summer Games in Atlanta. Hathaway and Meyer successfully clarified nighttime videotapes made with handheld camcorders, revealing important details about the bomb and the explosion.

Why did the FBI come to NASA for help?

As scientists, Hathaway and Meyer had developed expertise and equipment for enhancing images of the Sun and Earth's

atmosphere. They used this experience and worked together to invent the VISAR technology.

Since their first case with the FBI, Hathaway and Meyer have worked over the years to refine the VISAR technology, and that technology has been transferred to companies, like Huntsville's Intergraph Corp., and BARCO Inc. Display Systems of Duluth, Ga., that produce video enhancement systems for law enforcement, the military and even home computers.

Hathaway has been a Marshall Center employee since 1984, while Meyer and Nabors joined Marshall in 1985.

The writer, employed by ASRI, supports the Media Relations Department.

NASA selects 28 scientists for Mars rover participation

NASA Headquarters release

NASA has selected 28 scientists for participation in the 2003 Mars Exploration Rover mission. The mission consists of two separate, though identical, rovers scheduled for launch in mid-2003 and arrival at separate destina-

tions on Mars in early 2004.

The selected proposals were judged to have the best science value. The science objectives include studying rocks and soils for clues to past water activity, studying geologic clues of environmental conditions existing when liquid water was present and whether those conditions were conducive for life.

Lightning

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sensors. “The Optical Transient Detector was launched in 1995 and we got five good years out of it, compared to the two years expected, before it stopped transmitting data. The Lightning Imaging Sensor was launched on the Tropical Rainfall Measuring Mission satellite in 1997, and it’s still going strong. Basically, these optical sensors use high-speed cameras to look for changes in the tops of clouds, changes your eyes can’t see.”

By analyzing a narrow wavelength band around 777 nanometers — which is in the near-infrared region of the spectrum — they can spot brief lightning flashes even under daytime conditions.

Before the Optical Transient Detector and Lightning Imaging Sensor, only approximate global lightning patterns were known.

Ground-based lightning detectors employing radio-frequency sensors provide high-quality local measurements. Because such sensors have a limited range, oceans and low-population areas had been poorly sampled.

The development of space-based optical detectors was a major advance, giving researchers their first complete picture of planet-wide lightning activity. The new maps show that Florida, for example, is one place where the rate of strikes is unusually high.

Dennis Boccippio, an atmospheric scientist with the technology center’s lightning team, said the reason was because Florida experiences two sea breezes — one from the East Coast and one from the West Coast.

“The ‘push’ between these two breezes forces ground air upward and triggers thunderstorms,” Boccippio said.

Within thunderclouds, turbulence spawned by updrafts causes tiny ice crystals and water droplets, called “hydrometeors,” to bump around and collide. For reasons not

fully understood, a positive electric charge accumulates on smaller particles — that is, on hydrometeors smaller than about 100 micrometers — while negative charges grow on the larger ones. Winds and gravity separate the charged hydrometeors and produce an enormous electrical potential within the storm.

“Lightning is one of the mechanisms to relax this build-up,” Boccippio said.

Another lightning hot spot is in the Himalayas, where the extreme local topography forces the convergence of air masses from the Indian Ocean.

And where does lightning strike most

“Oceanic areas also experience a dearth of lightning,” Christian said. “People living on some of the islands in the Pacific don’t describe much lightning in their language. The ocean surface doesn’t warm up as much as land does during the day because of water’s higher heat capacity. Heating of low-lying air is crucial for storm formation, so the oceans don’t experience as many thunderstorms.”

According to Boccippio, these global patterns probably aren’t much influenced by human activity. Some people have suggested that buildings and metal communications towers increase the

overall frequency of lightning strikes. But, “lightning that does make it to the ground is pretty much creating its own channels,” Boccippio said.

“The likelihood that we are changing the amount of cloud-to-ground strikes with construction of towers is very slim.” He cautions, however, that this has not been verified experimentally.

To answer such questions, a new lightning detector — the Lightning Mapper Sensor

or “LMS” — is on the drawing board at the National Space Science and Technology Center. The proposed instrument would circle our planet in a geostationary orbit over the United States, detecting all forms of lightning with a high spatial resolution and detection efficiency.

The lightning sensor, or something like it, could provide valuable — even life-saving — data to weather forecasters.

“The same updrafts that drive severe weather often cause a spike in the lightning rate at the onset of a storm,” Boccippio said. “So, measuring the rate of lightning flashes in real time might offer a way to identify potentially deadly storms before they become deadly.”



Dr. Hugh Christian appears on ‘ABC World News Tonight with Peter Jennings’ discussing his work at the National Space Science and Technology Center.

Photo from Marshall Imaging Services

frequently? Central Africa. “There you get thunderstorms all year ‘round,” Christian said.

“It’s a result of weather patterns, air flow from the Atlantic Ocean, and enhancement by mountainous areas.”

The satellite data also track patterns of lightning intensity over time. In the Northern Hemisphere, for example, most lightning happens during the summer months. But in equatorial regions, lightning appears more often during the fall and spring.

Meanwhile, areas such as the Arctic and Antarctic have very few thunderstorms and, therefore, almost no lightning at all.



COBRA engine on track toward prototype

Marshall news release

Taking one step closer to a second generation reusable engine, the Marshall Center and Pratt & Whitney-Aerojet Propulsion Associates recently completed two major milestones for the Space Launch Initiative: a subscale preburner test and a fabrication and proof test of a subscale milled channel wall nozzle for the COBRA engine.

COBRA, short for Co-Optimized Booster for Reusable Applications, is a reusable, hydrogen-fueled liquid booster and second-stage engine with a thrust level of 600,000 pounds of force developed by Pratt & Whitney of West Palm Beach, Fla., and Aerojet of Sacramento, Calif.

Aerojet successfully completed testing the first of three subscale preburners for the COBRA engine. Preburners are used to start the engine by burning a fuel and oxidizer to provide power. The COBRA engine will feature a liquid fuel and oxidizer preburner — unlike the traditional

Work begins to test 'brains' for reusable launch vehicle

Marshall news release

The Marshall Center, in conjunction with Universal Space Lines LLC of Newport Beach, Calif., have created a software tool called Integrated Development and Operations System, or "IDOS," to enhance flight mechanics technologies for second generation reusable launch vehicles.

Flight Mechanics includes the guidance, navigation and control operations on the space vehicle.

The Integrated Development and Operations System provides a software development environment to design, develop, test and validate the "brains" of the vehicle — the guidance, navigation and control algorithms. These algorithms — a sequence of steps designed for programming a computer to solve a problem — are being developed by Ohio University in Athens. Once tested and validated, the algorithms will be loaded

on board the reusable launch vehicle flight computer.

The algorithms will enable the vehicle flight computer to determine, in real time, variables such as actual trajectory, acceleration, attitude, attitude rate, accurate position and velocity. The vehicle flight computer can then determine the best flight path for the vehicle. If the vehicle system detects a significant problem that would affect its flying qualities, it can engage other systems on the vehicle — such as propulsion — to keep the vehicle on a safe course to its planned destination or an alternative landing site.

Advancing guidance, navigation and control capabilities within the vehicle will allow for more automatic vehicle processes, which increase safety and reliability. This advancement will speed up calculations and mission development analysis, reducing time involved and operating costs.

gas fuel and oxidizer — to help lower temperatures and smooth ignition of the rocket engine.

Pratt & Whitney-Aerojet Propulsion Associates completed fabricating and proof testing of an approximately 40 percent scale, milled channel wall nozzle for the COBRA engine. The nozzle is the component connected to the thrust chamber that converts energy produced by hot gases of the ignited fuel and oxidizer

into velocity for ascent. The nozzle, capable of withstanding extreme temperatures and pressures, was structurally tested at pressures up to four times higher than normal operation.

The tests assist in validating the nozzle design, which will improve safety, cost and reliability while reducing traditional fabrication time from four years to one year.

Kennedy tests 'smart umbilical mating system' for Space Launch Initiative

Kennedy news release

Engineers at Kennedy Space Center are testing the newest in umbilical technology in support of NASA's Space Launch Initiative.

"Umbilicals are the lifeline for any Space Launch Vehicle," said Warren Wiley, Kennedy's SLI program manager. "Fluids including propellants, pressurization gasses, and cooling systems, power, communications and instrumentation readings all flow through the umbilical. They are large devices that are manpower intensive to mate, test and maintain."

Traditional umbilical systems release at vehicle lift-off and

can also take extensive connection time.

The Smart Umbilical Mating System, three years in development by Rohwedder Systems, of Oviedo, Fla., and NASA, will serve as a modern, next-generation umbilical system.

"The concept is to replace a traditional umbilical with an automated umbilical which has a mate, demate and remate capability," said Tom Lippitt, spaceport engineering and technology lead engineer. "The ability to quickly and reliably mate and demate umbilical connectors under automated control, along with remote connection verification would reduce the time and labor hours required to prepare for launch."

Marshall's e-Learning Library launch successful

From the Employee & Organizational Development Department

More than 65 individuals recently participated in Marshall's e-learning launch.

The event featured presentations on the new e-Learning Library and other technology-assisted opportunities.

The courseware library includes more than 2,000 training programs, online reference materials, articles, white papers and an advanced electronic mentoring service.

"I'm already receiving lots of positive comments about the new online courses," said John Heath of the Employee & Organizational Development Department. "With programs like project management, budgeting, stress management, strategic planning and Microsoft Office, there's something for everyone."

The real benefit of e-learning is that there is no need to constantly monitor schedules to find out when a course is going to be offered," Heath continued. "The online programs are never full, you can take only the modules that you need and they're available when you need them."

The e-learning library is part of a larger effort to expand continual learning opportunities at the Self-Study Learning Center, formerly EDTeC, located in Building 4200, Room G13.

With new resources for the on-site library arriving weekly and plans for revamping Marshall's Continual Learning Channels, soon to go into effect, the Self-Study Learning Center is developing into a viable part of NASA's overall focus on education and continual learning.

For more information, contact the Self-Study Learning Center at 544-8191, e-mail Self.Study@msfc.nasa.gov or go to the Marshall e-learning Web site at <http://mi.msfc.nasa.gov/elearning>

Obituaries

Clough, William W., 79, of Huntsville, died May 21. He retired from Marshall in 1976 where he worked in the Logistics Office. He is survived by his wife, Katherine D. Clough.



Photo by Dennis Olive, NASA/Marshall Center

Free baseball tickets

Teresa Davis hands Steve Devaney a free ticket for Monday's "NASA Goes to the Stars" baseball game between the Huntsville Stars and the Chattanooga Lookouts. Free tickets for Marshall team members are available at the NASA Exchange, Bldg. 4203 cafeteria and the Wellness Center. The first 2,000 children attending the game with a parent or guardian will receive a free coloring book. Also available are 100 free upper box seats on a first-come, first-serve basis at the Government and Community Relations Department, Bldg. 4200, Room 828. For more information, call Cate Phillips at 544-3828.

Job announcements

MS02D0056, AST, Technical Resources Management. GS-801-07/09/11, Space Shuttle Projects Office. No closing date.

MS02C0121, AST, Technical Management. GS-801-14, Engineering Directorate, Engineering Systems Department, Configuration and Data Management Group. Closes June 17.

MS02C0152, AST, Technical Resources Management. GS-801-15, Space Shuttle Projects Office, Reusable Solid Rocket Motor Project. Closes June 17.

MS02C0153, Budget Analyst. GS-560-14, Office of Chief Financial Officer, Agency Core Financial Office. Closes June 21.

MS02C0154, AST, Aerospace Flight Systems. GS-861-14, Engineering Directorate, Engineering Systems Department, Systems Engineering Group. Closes June 17.

MS02C0155, AST, Flight Vehicle Atmospheric Environments. GS-

861-14, Engineering Directorate, Engineering Systems Department, Environments Group. Close June 17.

MS02C0149, AST, Aerospace Flight Systems. GS-861-15, Second Generation RLV Program Office, Systems Engineering and Integration Office. Closes June 20.

MS02C0150, AST, Aerospace Flight Systems. GS-861-15, Second Generation RLV Program Office, Systems Engineering and Integration Office. Closes June 20.

MS02C0151, AST, Technical Management. GS-801-14, Second Generation RLV Program Office, Program Planning and Control Office. Closes June 20.

MS02C0148, AST, Technical Resources Management. GS-801-14, Second Generation RLV Program Office, Program Planning and Control Office. Closes June 19.

MS02C0147, AST, Aerospace Flight Systems. GS-861-14, Second Generation RLV Program Office, Systems Engineering and Integration Office. Closes June 18.

Center Announcements

'Freedom to Manage' in place for employee suggestions

As outlined by Administrator Sean O'Keefe, NASA has begun the "Freedom to Manage" program to remove barriers to effectiveness and efficiency present in the Agency. Impediments of any kind are open to examination, analysis and possible elimination in this program. A Web site where employees may suggest ideas to eliminate barriers is at <http://f2m.nasa.gov/>

University scholarships available

Two university scholarships sponsored by the Marshall Association are available for incoming freshmen in September. Both technical and non-technical scholarships will be awarded. The Association will accept applications for the scholarships until July 31. Completed applications should be submitted to Cliff Bailey in AD01 or call 544-5482.

Thrift Savings Plan for Marshall employees open

Marshall employees can change their contributions to Thrift Savings Plan accounts until July 31. Employees also may begin contributions to their accounts during this period. Those electing to enroll or increase funds in the plan can obtain a TSP-1 Form from www.tsp.gov. There are five different funds to choose from. For more information, call Ginger Martin at 544-5654 or Debbie Allen at 544-7536.

Marshall Retirees Association offering university scholarship

Students who are descendants of a Marshall Center retiree can apply for the NASA-MSFC Retirees Association Scholarship at the University of Alabama in Huntsville. The \$1,000 scholarship will be awarded for the academic year beginning in the fall. To be eligible, the student must be a direct descendant of a Marshall retiree or a direct descendant of a member of the NASA-MSFC Retirees Association. Qualifying students also must be an entering freshman enrolling full-time at UAH and majoring in engineering or the

physical sciences. The award is based on academic merit, citizenship, leadership and a demonstrated interest in space-related engineering or science. For more information, call UAH Student Financial Services at 824-2755.

Marshall cafeterias closed July 5

Cafeterias in Bldg. 4610, 4203 and 4471 will be closed July 5.

NASA Performance Evaluation Profile Survey required

All Marshall team members, civil service and contractor, are required to complete the Performance Evaluation Profile Survey. A training module is at the Safety, Health and Environmental Web site. The training module can be completed in about one hour. For assistance, or for more information, call Dennis Davis at 544-8628, or Kristie French at 544-7474.

Styx, Kansas discount tickets available for Redstone show

Redstone Arsenal is offering discount tickets for the Styx and Kansas concert set for Aug. 24. The discount advance tickets are available Thursday, June 13, for \$13. Afterward, tickets are \$15 and \$20 on the day of the show. Marshall team members can pick up tickets at the ITR at Bldg. 3711 on Aerobee Road, Redstone Officers' and Civilians' Club, AAFES cashier's window, Redstone Lodging and the Sparkman Cafeteria. For more information, call 876-4531 or go to www.redstonemwr.com

Did you once race a moonbuggy?

Planning for the 10th Annual Great Moonbuggy Race, to be held in 2003, has begun. Organizers would like to find any Marshall team members who raced on a past moonbuggy team. For more information, call Durlean Bradford at 544-5920.

Employee Assistance Program

Dr. Bruce Mather, Marshall's Employee Assistance Program coordinator, will be absent from the Center for

about six weeks. Dr. Jeanne D. Richmond is handling day-to-day program activities. Richmond can be contacted at 544-7549 or at the Medical Center, Bldg. 4249, Room 126.

Web TADS training

The Center-wide rollout of Web TADS 2.0 at Marshall will be delayed until about July 15. Currently, there is a Web TADS pilot with several small organizations that will continue until the Center-wide rollout, which will allow time for additional training. The NASA Payroll and Center Personal Services Office will schedule training on the system along with hands-on labs to answer any questions. For more information, call Nikki Miller at 544-8955.

Clubs and Meetings

Shuttle Buddies meet June 24

The Shuttle Buddies will meet for breakfast at 9 a.m., June 24, at Mullins Restaurant on Andrew Jackson Way. For more information, call Deemer Self at 881-7757 or Gail Wynn at 852-8189.

Author James N. Chiles to speak at Marshall Association meeting

The Marshall Association will meet at 11:30 a.m., June 20, in Bldg. 4203, Room 1201. James N. Chiles, author of "Inviting Disaster: Lessons from the Edge of Technology," will be guest speaker. He is a regular contributor to "Smithsonian" magazine and "Air & Space." Many of his articles have dealt with system malfunctions and safety discipline. Attendance is limited to the first 56 reservations. For information, e-mail, or call, Cliff Bailey at 544-5482. Cost of lunch is \$8 and reservations are due Monday.

Genealogical Society meeting

The Huntsville Genealogical Computing Society will meet at 7 p.m., Monday, at the Huntsville-Madison County Main Library. For information, call 882-8655.

Employee Ads

Miscellaneous

- ★ Trailer hitch, fits several GM cars, \$49. 881-6595
- ★ Kenwood 5-way stereo speakers, \$90 each. 881-8674
- ★ Stair-stepper, \$15; Nordic Track skier, used 2 hrs., \$75; Orbitrek, new, \$125. 498-0219
- ★ Iomega 100MB external zip-drive w/4-5 disks, \$60; Craftsman self-propelled reel mower, 2-grass collectors, \$350. 325-6000
- ★ Single waterbed, honey maple w/brass trim; includes heater, comforter, & bedding, \$150. 859-0729
- ★ Carpenters tools: compressors, nail guns, saws, etc. 859-4140
- ★ Concrete mixer, 3.5 cu. ft., metal tub, \$225; Large Hunter ceiling fan, walnut, \$30. 837-6776
- ★ Hot Point refrigerator, white, crushed and cubed ice. \$550. 539-5995
- ★ Coach handbags: large black, \$75; small black, \$45. 256-757-0469
- ★ 1996 Suzuki DR650SE dual-purpose motorcycle, \$3,250. 883-7729
- ★ Trek 950 mountain bike, 20" frame, 21-speed, Rock Shok front & pump, \$525. 256-539-7260
- ★ Sears 25CF side-by-side refrigerator/freezer w/ice & water in door, \$400 obo. 508-2494
- ★ Clothes for little girl, 0-9 months, summer and fall. 256-232-9552
- ★ Historic America, Johnson Bros. dishes, 28 piece set, ironstone, \$125. 882-1097
- ★ Rattan glass-top table, 40"wx72"L, six roll-around chairs, \$250; four Rattan barstools, \$25 each. 256-355-3089
- ★ Back packing gear, name brand, lightly used, \$300. 881-9233
- ★ Hay-baler, 5'x6', used little, \$16,500 obo. 852-5446
- ★ SunMaster tanning bed, 18-bulb, \$1,000; Sectional sofa/queen bed w/2 recliners, connecting table, blue, \$700. 694-1284
- ★ Pet carrier; bird cage; GE electric clothes dryer; Schwinn, male & female, 10-

- speed bicycles. 881-6040
- ★ 1996 Suzuki DR650SE dual purpose motorcycle, \$3,250. 883-7729
- ★ Troy-Bilt chipper/vac, deluxe model, \$400. 256-931-2822
- ★ Matching white pearlized glass and antique vase-shaped formal table lamps with shades, \$75. 461-8721
- ★ Whirlpool self-cleaning electric oven/range, \$150; side-by-side refrigerator w/ice in door, \$225; both white. 536-4507
- ★ Wheel Horse riding mower, Kawasaki 12.5HP, 37" deck, hydrostatic transmission, 336 hrs., \$850. 830-6584
- ★ Kenmore upright freezer, 9.0 cu. ft., almond, runs, \$95. 325-0705/337-0075
- ★ GE Washer and dryer, white, \$100 for both. 655-6444
- ★ Pressure treated lumber, limited assorted sizes, 2x3, 2x10, 5/4x6, 1-year old, never used. 379-4677
- ★ Kitchen Aid washer and Kenmore dryer, \$200. 828-3181
- ★ Baby crib, mattress and bedding, \$60. 961-1841
- ★ Dynamark riding mower, 32" rear discharge cut with B&S 10HP engine, \$400. 539-5058
- ★ Black Dodge Ram 1500 bedliner, \$75. 772-8312
- ★ Above ground pool, 42"x15', w/ladder & sand filter, new, pool cover, skimmer & 3" chlorine tablets, \$175. 721-7351
- ★ HP computer w/games, e-mail, word processor, Power Point, Excel & CD burner, \$335. 256-881-0278
- ★ Toro 32" riding mower, 8HP Briggs & Stratton, \$50; Sears Craftsman radial-arm saw, rolling cabinet, \$50. 882-0271
- ★ Playstation 2, DVD remote, 4-games, two controllers, \$255 obo. 489-0136

Vehicles

- ★ 1992 Honda Accord EX, one-owner, auto, air, PW/PL, moonroof, well-maintained, \$4,200. 881-9647
- ★ 1999 Honda Civic Hatchback, red, 37K

- miles, 5-speed, a/c, CD, under warranty, \$10,000. 256-534-9364
- ★ 1993 Toyota Celica convertible, 5-speed, tint, a/c, power, white/black top, new engine, \$6,000. 461-7947
- ★ 1972 Nova, call for details. 130-9348
- ★ 2000 Honda Accord EX, 26.5K miles, CD player, sunroof, burglar alarm, keyless entry, \$17,458. 325-3304
- ★ 1997 Ford Ranger XLT, 5-speed, 55K miles, am/fm/cassette, bedliner, alloy wheels, garage kept, \$4,950 firm. 256-753-2278
- ★ 1994 Dodge Grand Caravan LE, loaded, CD player, Infinity sound system, one-owner, \$4,900. 722-8116
- ★ 1994 Jeep Cherokee, 2-door, 4x4, 4.0 6 cyl., 199K miles, \$3,300. 256-723-3803
- ★ 1989 Corvette, red, gray leather, all-power, 93K miles, \$9,250. 256-878-1579/256-878-9082
- ★ 1990 Nissan Maxima GXE, 167K miles, digital display, HUD, new tires, moonroof, garage-kept, \$3,200. 961-9340
- ★ 1988 Delta 88 Oldsmobile, 138K miles, white w/gray interior, original-owner, 4-door, needs few repairs, \$1,300. 882-9695
- ★ 1998 Ford Windstar LS, 81K miles, rear air, \$9,500 obo. 489-4894
- ★ 1994 Chevy S-10 Blazer 4D/LT, 1-owner, \$6,750; 1992 Firebird Formula, 8-cyl., T-tops, 1-owner, \$5,250. 653-0406
- ★ 1990 Pathfinder SE, 2-door, red, 5-speed, 4WD, a/c, cassette, 166K miles, new tires, \$4,000. 256-864-3133

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- ★ Flat-bottom boat, under 14', suitable for 30HP motor. 256-655-6699
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Free

- ★ Lava rocks for planter or landscaping. 971-1414

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